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FIRE PROTECTION METHOD

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FIELD OF THE INVENTION

The present inventive method relates to fire protection and more
5 particularly to a method of deploying integrated defensive and offensive
methods to protect municipalities within a predefined region against forest
fires and the associated economic loss and loss of human life.

BACKGROUND OF THE INVENTION

10 Unwanted forest fires, typically caused by natural phenomena or human
negligence or error, have the potential to result in great economic loss and
loss of life. Regional and national economic loss can be substantial and be
incurred from any and all of the following:

- Loss of valuable assets or structures;
- 15 Loss of economic production due to evacuation notice, alert and
actual evacuation orders to community members under
threat;
- Loss of regional revenue due to a drop in economic activity, as
contributors to the economy temporarily or structurally divert
20 to other regions;
- Loss of income from tourism, as tourists divert to alternate regions;

1 Loss of resources, as fighting out-of-control forest fires demands the
 deployment of significant numbers of fire fighting specialists,
 crew, equipment and substances; and
 Loss of human life.

5 Forest fires either originate in the forest or other natural combustible
 environments (due to lightening strike or other natural phenomena, human
 negligence or error or other), or originate in a human environment (building,
 law or corporate complex, roadside or other) and subsequently spread into
 combustible vegetation and/or forests or forested areas. The latter are also
10 known as “interface fires.” Further reference to “forest fires” includes
 “interface fires.”

 To protect regional life and economies against the threat of forest fires,
 means have been deployed that can be categorized into three categories:
 Preventive; Defensive and Offensive.

15 **Preventive methods**

 Preventive methods seek to mitigate risks and damage in case a forest
 fire reaches a community and include any or all of the following:

 Advisories or regulations defining the limits of permissible access
 into and activity in forested areas, depending on the risk of
20 forest fires. The drier the season, the higher the risk. Typically
 such advisories or regulations use staged levels of risk
 categories, which - as the risk of fire increases - increasingly
 limit access into and activity in forested areas;

- 1 Vegetation management;
Zoning, combined with advisories or regulations pertaining to which
fire preventive measures are to be deployed within each
zone;
- 5 Construction or deployment of fire guards, including fire breaks
(areas void of fuel) and fuel breaks (trenches down to mineral
soil that stop surface fire spread);
Advisories or regulations for the disposal of forest debris (vegetation
management combustibles requiring disposal);
- 10 Advisories or regulations related to structures (roofing, chimneys,
stovepipes, exterior siding, window and door glazing, eaves,
vents and openings, balconies, decks, porches, trailers and
mobile homes, and on-site fire fighting equipment); and
Advisories or regulations regarding infrastructure (access routes,
15 open spaces or green belts, water supply, utilities - electricity
and gas).

Defensive methods

- The threat of forest fires to urban areas large or small, is as old as
mankind. Up to the arrival of electricity and subsequent advances in
20 technology, forest fires were detected through human observation. The fire
itself, the smoke it produced, the embers it scattered through the air, the
heat it radiated, the wildlife it scared off its path or the noise it made -
individually or combined - would alarm man of the presence of a forest fire.

1 In case the potential threat was regarded sufficiently significant, forest
fire lookouts would be posted in the surroundings of the geographic
locations one sought to protect. These lookouts would typically be posted
at vantage locations, offering a good lookout over the region to be
5 monitored. The lookout would take position on the highest hill in a region, in
the top of a tall tree, or one would construct lookout towers, or use existing
towers or high structures. When a fire was observed, the lookout would
trigger an alarm through methods available to the lookout. This method
requires that the human lookout systematically scans or surveys the area
10 he is assigned to, without incidental or semi-structural failure to do so due
to fatigue, drowsiness, illness, distraction or other factors.

 The above ancient method is still in use at the time of writing this
chapter on Background Art. As a matter of fact, it still remains the principle
methods of forest fire detection around the world. What is needed, is a
15 detection method which is independent of intrinsic human error.

20th Century (and beyond) advances in forest fire detection technology

 With the arrival of electronics, society has invented and used new
methods to detect forest fires. United States Patent 5,422,484 offers an
20 example which utilizes Infrared detection technology. United States Patent
5,049,756 offers a method to effectively utilize infrared detectors, by
describing a manner to automatically scan or survey the assigned area
through the use of a mounting device, allowing for movement in both the

1 horizontal and vertical planes. United States Patent 5,049,756 further
describes a method to extract the geographic location of a forest fire,
through the geometric use of available input. United States Patent
6,281,970 describes another method of involving infrared technology as a
5 mode to detect forest fires, namely an airborne infrared fire surveillance
system.

Other advanced technologies used to detect forest fires are laser beam
technology (see United States Patent 4,893,026) and advanced imaging
analysis technology (see South Africa Patent 961673). Since the launch of
10 spacecraft equipped with observation technology, the data from spacecraft
is used to detect and/or monitor forest fires.

Facilitating defensive methods

Local, regional, state/provincial and national authorities (government,
fire department, medical, military, police and other) typically deploy a
15 variety of command and control infrastructures, including incident, accident
or disaster management manuals, guidelines and standard operating
procedures (SOP's). These infrastructures, manuals, guidelines and SOP's
increasingly come into effect as a forest fire threat increases. This
subparagraph on facilitating defensive methods is grouped under the
20 category "Preventive methods" as they typically are structured and
operative in a reactive manner.

For instance, a fire event occurs. Infrastructures, manuals, guidelines
and SOP's collectively command reactive action. Status quo is evaluated.

1 Based collectively on infrastructures, manuals, guidelines and SOP's,
reactive action is escalated or de-escalated depending on status quo.

Due to a forest fire's potential to expand at tremendous pace - when
occurring under ideal (extremely dry) forest fire growth conditions - every
5 year forested regions are confronted with uncontrolled or "wild" forest fires.
These forest fires ultimately pose the greatest threat to the local, regional,
state/provincial or national economy and human life.

Offensive methods

All fire fighting methods deployed through the ages are based on the
10 laws of physics governing fire. A fire requires three ingredients to occur or
to keep on burning, collectively known as the "fire triangle": Fuel,
Temperature, and Oxygen. Remove one or more of these ingredients and
the fire will stop. Reintroduce a missing ingredient and the fire may reignite.
Examples of removal of fuel are: Clearing segments of forests in the vicinity
15 of the fire; Back-burning, i.e. the intentional controlled burning down of
forest sections in the vicinity of a forest fire; Soaking forests or assets under
threat of forest fire with water or specialist fire retardant. Examples of lower
temperature are: Spraying with water or specialist retardant. Examples of
removing oxygen are: Covering the fire with water or specialist retardant
20 foam, gel or other.

Equipment used to apply any or all of the above or other fire fighting
principles may include a variety of handheld or small tools such as chain
saws, axes and other, (all terrain) fire fighting engines, forestry equipment,

1 helicopters equipped with special equipment and specially converted or
built aircraft. All of these are well known and documented.

The Key: Extinguish a fire as early as possible

5 When a forest fire reaches a size and dynamics which render it
“uncontrolled,” defensive and offensive methods have failed to contain the
fire, resulting in a fire actually posing a threat to human life and the regional
or national economy. This undesired outcome occurs annually within near
every densely forested region in the world. As all forest fires start with a
single flame posing no threat to either human life or the economy, the key
10 to avoiding uncontrolled forest fires lies in the effective, rapid response to a
fire event.

Methodological problem described

As all forest fires start with a single flame posing no threat to either
human life or the economy, each “uncontrolled fire” testifies to the fact that
15 defensive and offensive methods were utilized too late, allowing a single
flame to grow until a fire reaches uncontrolled fire status.

Defensive and offensive methods typically resort under a variety of legal
entities or command structures - each with its own command and control.
Though individual command and control centers may be directed by a
20 hierarchically superior central command and control center, multiple steps
in communication are required in reporting, analyzing, formulating
response, commanding and executing offensive measures. Moreover,
command and control structures are escalated or de-escalated

1 proportionate to the threat level of a fire. It follows that a reaction to a small
fire is on a small scale, and - only when it grows towards becoming an
uncontrolled fire - does it command more effective and appropriate
command and control structures to be effectuated and methods to be
5 released.

When a forest fire ultimately reaches a size and dynamics which render
it an “uncontrolled fire,” defensive and offensive methods have failed to
contain the fire, resulting in a fire actually posing a threat to human life and
the regional or national economy. This undesired outcome occurs annually
10 within every densely forested region in the world. The French, British
Columbia (West Canada) and Californian (USA) forest fire Season 2003
particularly challenges current methods to protect municipalities within a
predefined region against economic loss and loss of human life caused by
forest fires.

15 What is needed is an economically viable, structured method deploying
integrated defensive and offensive methods to protect municipalities within
a predefined region against economic loss and loss of human life caused
by forest fires.

20 **SUMMARY OF THE INVENTION**

The present invention is a method to protect assets within a defined
region against the threat of fire.

1 First, aerial forest fire fighting assets are positioned under a central command and within a range allowing the assets to reach and attack a surveyed fire anywhere within a periphery of one or more strategic assets within 60 minutes of issuance of an order to attack a fire.

5 Second, available regional ground fire fighting assets are integrated to follow up initial forest fire aerial attacks.

 Third, the periphery of the strategic assets are continually surveyed under the central command using one or more sensors, the periphery being at least ten miles in radius.

10 Fourth, surveillance data from sensors is gathered in the central command.

 Fifth, surveillance data is analyzed according to user defined algorithms and database data in the central command.

 Sixth, surveillance data combined with meteorological data is analyzed
15 by the central command in order to determine fire risk potential in the area under surveillance.

 Seventh, aerial and ground forest fire fighting asset alert status is adjusted by central command based on the determined fire risk potential.

 Eight, an alarm status is generated in the central command based on
20 comparison of the analysis of surveillance data with reference data.

 Ninth, the aerial forest fighting assets are alerted when the comparison justifies such alerting, such alerting being communicated by the central

1 command and includes all available data, including fire location,
recommended routing and recommended attack strategy.

 Tenth, an order to aerial attack a detected fire using the aerial forest
fighting assets is initiated when the comparison justifies such order, such
5 order being issued by the central command.

 Eleventh, surveillance data from sensors gathered in the central
command is analyzed according to user defined algorithms and database
data to track the detected fire, estimate its size in terms of dimension and
energy and predict fire growth rate.

10 Twelfth, aerial forest fire fighting assets and available regional ground
fire fighting assets receive fire estimated size in terms of dimension and
energy and predicted fire growth rate data from the central command.

 Thirteenth, hierarchical superior fire fighting command and control
assets are alerted when the comparison justifies such alerting, such
15 alerting being communicated by the central command.

 Fourteenth, the third through thirteenth steps are repeated when the
comparison justifies repeating the steps.

 The numbering of the steps does not necessarily indicate an ordering,
but rather is used as an identification of the steps. This method can be
20 used to protect strategic assets, including municipalities, high value,
military, urban, industrial, infrastructure, commercial and other assets
against the threat of forest fires. Other modes of usage or applications for
the method of deploying integrated defensive and offensive methods to

1 protect municipalities within a predefined region against economic loss and
loss of human life caused by forest fires, will become apparent from a
consideration of the invention description and drawings.

Advantageously, the present invention allows for centralization of all
5 data into a single location, creating improved situational awareness,
increased data analysis, improved data analysis results, improved fire
behavior prediction, improved accuracy in directing fire fighting assets
geographically, improved accuracy in directing fire fighting assets in terms
of fire fighting means to be deployed, reduced response times and a
10 shortening of the time available in which a fire can grow before fire fighting
assets are in place at the scene of the fire.

As yet a further advantage, the present invention allows for
centralization of all data into a single entity, creating improved situational
awareness, increased data analysis, improved data analysis results,
15 improved fire behavior prediction, improved accuracy in directing fire
fighting assets geographically, improved accuracy in directing fire fighting
assets in terms of fire fighting means to be deployed, reduced response
times and a shortening of the time available in which a fire can grow before
fire fighting assets are in place at the scene of the fire.

20 As still yet a further advantage, the present invention allows for
centralization of all data into a computer, reducing the risk of human error,
increasing the accuracy of data analysis, improving the ability to store data
in a data base for both continuous and retrospective analysis, increasing

1 the speed of data analysis, improving the accuracy of data presented to fire
fighting assets, increasing the amount of data available to fire fighting
assets in the limited time available, reducing the risk of communication
errors and shortening the time in which a fire can grow before fire fighting
5 assets are in place at the scene of the fire.

BRIEF DESCRIPTION OF DRAWINGS

The following paragraphs briefly describe each drawing.

Drawing A

10 Drawing A shows a simplified schematic of an optical sensor (10)
mounted on a servomotor driven gimbal device (12) allowing the sensor
(10) full 360 degree rotation in the horizontal plane and plus or minus 45
degrees of motion in the vertical plane. The servomotor driven gimbal
device is computer controlled through signals (15) coming out of a
15 computerized control console ("Drawing B" 20) located in a control room
(40). Sensor data from optical sensor (10) signals (15) are transported to a
computerized control console ("Drawing B" 20).

Drawing B

Drawing B depicts a computerized control console (20), with four
20 individual optical sensors (10) connected to it, through bi-directional signal
(15) transmission connections. Computerized control console (20) controls
and directs each optical sensor (10) through signals (15). Computerized
control of optical sensors (10) can be manually overridden by a console

1 operator. Data from each optical sensor (10) is computer analyzed inside computerized control console (20). When computer analysis of data signals (15) from one or more optical sensors justifies an alarm, computerized control console (20) will alarm the console operator or operators and any 5 and all specified and required other agency or entity ("Drawing C" 45, 35, 50) through alarm signals ("Drawing C" 65).

Drawing C

Drawing C demonstrates the relationship between the several parts 10 1 constituting or contributing to the claimed method. Optical sensors (10) are 0 connected to a computerized control console ("Drawing B" 20) inside a control room (40). Connection is realized through data signals (15) which are bi-directional: From each optical sensor (10) flow sensor data and sensor vertical and horizontal angular position data signals (15) to the 15 computerized control console ("Drawing B" 20). From the computerized 1 control console ("Drawing B" 20) flow optical sensor (10) sensor vertical 5 and horizontal angular positioning data signals (15) to each individual optical sensor's (10) servomotor ("Drawing A" 12).

When computer analysis or manual override justifies alerting, alarming 20 or command ordering forest fire fighting assets, alert or alarm signals or orders and/or information or data (65) are transmitted to aerial fire fighting 2 station (45), ground fire fighting station (or stations) (50) and local and/or

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1 regional and/or state/provincial and/or national disaster or emergence
control centers (35).

Drawing D

5 Drawing D shows a schematic diagram of a typical deployment of the
present system. Control room (40) is depicted in the center of a
municipality or strategic asset requiring protection against the threat of
forest fires. In actual deployment, thanks to current state-of-the-art signal
transmission technologies, Control room (40) could be located anywhere.
However, Drawing D depicts it CO-located in a municipality or strategic
10 asset requiring protection (which municipality or asset is not depicted, but
can be thought of as being about object 40 on this drawing). In this
particular drawing, the municipality or strategic asset requiring protection, is
surrounded by five optical sensors ("Drawing A" 10) mounted on vantage
positions (tower, building, natural feature or other) allowing each optical
15 sensor to survey or optical sensor map radius area 55. An additional optical
sensor is positioned in the center of the municipality, surveying the
immediate periphery. Airport 45 contains aerial forest fire fighting assets
(fixed wing aircraft, helicopter or other) on quick reaction alert. The location
of airport 45 allows for aerial forest fighting assets to reach a maximum
20 range (60) within a maximum allowable time period from computerized
control console ("Drawing B" 20) alert to actual aerial forest fire fighting
asset drop of fire retardant, water or other fire fighting or fire containment
substance. Ground forest fire fighting assets (50) are located at a location

1 allowing said assets to reach a maximum range (60) within a maximum
allowable time period from computerized control console "Drawing B" 20)
alert to ground transport arrival at the actual fire location indicated by the
computerized control console ("Drawing B" 20).

5 Actual deployment of depicted assets may vary depending on each
location's unique geographic and physiologic (and/or other) demands.

DETAILED DESCRIPTION

10 Definitions

"Forest fire" in the description, claims and abstract texts applies to both
forest fires originating in an area covered in whole or in part with forests or
other combustible vegetation (due to lighting strike or other natural
phenomena, human negligence or error or other), and fires originating in a
15 human environment (building, law, corporate complex, roadside or other)
and able to spread or subsequently spreading into an area covered whole
or in part with forests or other combustible vegetation.

"Uncontrolled fire" in the description claims and abstract texts applies to
a fire that increases in total surface burning area, or increases in energy
20 release, in spite of human measures seeking to avoid the increase.

"Strategic asset" in the description claims and abstract texts applies to
any asset that is subject to degradation in a forest fire and is worthy of
protection through a forest fire prevention and protection program.

1 Strategic assets 42 may include at least part of one or more of the
following: a municipality, high value assets such as buildings or structures,
infrastructure assets, military assets, industrial assets, commercial assets,
urban assets, heritage assets, and human life.

5 **The Method**

The present method is designed to protect a strategic asset or assets
42 within a defined region or periphery 60 against a threat of uncontrolled
fire.

Preferably, the present method is deployed to provide the said
10 protection permanently or (semi-)permanently, where the method is
deployed prior to the existence of any fire within periphery 60 and retained
in place throughout the season or seasons that any possible chance of an
uncontrolled fire exists or is believed to exist within periphery 60.

Preferably, the present method is deployed night and day, seven days a
15 week throughout the season or seasons that any possible chance of an
uncontrolled fire exists or is believed to exist within periphery 60.

Positioning of Aerial Forest Fire Fighting Assets

Aerial forest fire fighting assets 46, which may be on quick reaction
alert, are positioned within a range allowing the aerial assets 46 to reach
20 and attack a surveyed fire anywhere within a periphery 60 of one or more
strategic assets 42 within sixty minutes or so of issuance of an order to
attack a fire. Desirably, the periphery 60 is at least 10 miles in radius.
Preferably, the position of aerial forest fire assets 46 allows these assets,

1 following issuance of an order, to reach and attack a fire anywhere within
periphery 60 within 15 minutes or so.

Drawing D shows an airport 45 positioned near the center of the
strategic asset 42's periphery 60. The airport may be for use by fixed wing
5 forest fire fighting aircraft, or fire fighting helicopters, or both. Topographical
or terrain features or other factors within periphery 60 may require more
than one airport or positioning of the airport closer to one edge of the
periphery 60. For instance, ground structure in mountainous areas may
delay the amount of time it takes for an aircraft to reach parts of the
10 periphery 60. Yet another example, in case strategic asset 42 is a
municipality, urban area overflight restrictions may favor positioning two or
more airports within periphery 60. The solution lies in the strategic
positioning of the airport 45 or multiple airports 45. The aerial fire fighting
assets 46 may be suitable for use in urban areas and augmented with
15 ground fire fighting assets 50.

Available regional ground fire fighting assets 50 are integrated to follow
up initial forest fire aerial attacks. The aerial fire fighting assets 46 may
work in conjunction with, separately from or be replaced by ground fire
fighting assets 50. Ground assets 50 may include troops, fire trucks, bull
20 dozers and other heavy equipment, chain saw and other cutting devices, or
an other non-aerial equipment that is suitable for cooling a fire, removing
fuel from the progress of the fire or suffocation of the fire.

1 The aerial assets 46 and ground assets 50 are positioned about one or
more strategic assets 42.

Continuous night/day Surveillance: Optical Sensors

Referring to Drawings A and D, sensors 10 are used to continually
5 survey an area 55 about the strategic assets 42, herein referred to as an
optical sensor map radius area 55. One or more sensors 10 may be
deployed to provide a wall of surveyed area, e.g. overlapping optical
sensor map radius areas 55, as shown in Drawing D. The sensor 10 is
desirably an optical sensor able to sense fire, glow or smoke. The sensor
10 10 is desirably mounted on a vantage position, offering it unrestricted view
of its optical sensor map radius area 55. Such vantage position may be
obtained by mounting the sensor 10 on top of a natural feature, a tower, a
commercial or private real-estate building, a combination of the
aforementioned or other. Optical sensor 10 may be mounted on a
15 servomotor driven gimbal device 12, allowing the sensor 10 full 360 degree
rotation in the horizontal plane and sufficient motion in the vertical plane to
enable the optical sensor 10 to potentially see any geographic surface
position contained within optical sensor map radius area 55. The
servomotor driven gimbal device 12 may be computer controlled through
20 signals 15 coming out of a computerized control console ("Drawing B" 20)
located in a control room 40.

Sensor data from optical sensor signals 15 are transported to a
computerized control console ("Drawing B" 20).

1 Through the use of geometry, as optical sensor 10 is mounted on a
gimbal driven by servomotors contained in the servomotor driven gimbal
device 12, the geographic position of a fire or any object surveyed by
optical sensor 10 may be obtained. Such geographic position data, herein
5 referred to as geographic position data, may be expressed in bearing and
range in relation to the geographic position of optical sensor 10, in latitude
and longitude, in a grid position or other preferred manner. The geometric
calculations required to produce geometric position data, may be
performed by a computing device contained within the optical sensor 10 or
10 servomotor gimbal device 12, or within a control room 40. Inside control
room 40, geometric calculations may be performed by a computing device
contained within a computerized control console 20.

 Where the periphery 60 of a strategic asset contains sectors or regions
that do not contain combustibles, one or more sensor 10 installations may
15 not be required. In which case only a part or portion of periphery 60 is
surveyed. For instance, when strategic asset 42 is located on the seashore,
it is not required to survey the sea for fire incidences and thus no optical
sensor 10 is required to survey that sector of periphery 60 containing the
sea (or lake or ocean or bare rock formation or other noncombustible).

20 Other reasons may exist why it is not advantageous, required or desired
to survey the entire periphery 60.

Continuous night/day Surveillance: Analysis

1 Surveillance data is gathered from sensors 10 in a control room 40,
interchangeably referred to as central command 40 as shown in Drawings
B and C.

Sensor(s) 10 are controlled by signals 15 from central command 40.
5 Preferably, control of sensor(s) 10 is performed by a computerized control
console 20. Sensor signals 15 from sensors 10 preferably are transmitted
to a computerized control console 20, which is positioned in central
command 40. The analysis of surveillance data may be performed by way
of the central computing device 20 with or without operator intervention.
10 This allows the moment-by-moment data to be compared with surveillance
and reference data previously obtained, by which fire analysis data can be
determined. Preferably, fire analysis is determined by use of a computing
device, storing data and making use of stored data within a database.

Fire analysis data may contain data on the physical size of the fire,
15 expressed in fire surface area dimensions. Physical size of the fire may be
determined using geographic position data referred to in the close of the
previous subparagraph, entitled "Continuous night/day Surveillance:
Optical Sensors".

Fire analysis data may contain data on potential fire hazard, which may
20 be determined using geographic position data combined with
meteorological data pertaining optical sensor map radius area 55 combined
with known available fuel at and in the vicinity of the fire. Fuel availability
data may be obtained through recording available type and quantity of

1 combustibles at any given location within optical sensor map radius area
55. Fire analysis data may contain data on the fire trend (does it grow; is it
stable; is it getting smaller), based on analysis of successive fire analysis
data on physical size of the fire and potential fire hazard.

5 Fire analysis data may contain data on the expected or predicted fire
trend (fire growth in size or intensity; fire direction of movement), based on
the aforementioned fire trend data, combined with meteorological data and
meteorological forecast data pertaining optical sensor map radius area 55
combined with known available fuel at and in the vicinity of the fire.

10 Fire analysis data may contain data pertaining a recommended fire
attack strategy. Which may be expressed in terms of type and quantity of
aerial fire fighting assets 46 or ground fire fighting assets 50 to be prepared
or ordered to attack the fire. Which, in turn, may include recommendations
on type and quantity of fire containment assets, (such as fire retardants or
15 other) to be used in an attack on the fire.

Fire analysis data may contain geographic position data, expressed in
terms allowing aerial fire fighting assets 46 and ground fire fighting assets
50 an immediate understanding of the optimum aerial or ground surface
route (whichever applicable) to be used to reach, approach and attack the
20 fire.

All of the aforementioned fire analysis data may be stored in a
database, allowing for future reference. Future reference to the stored data,

1 when included in a fire analysis process, may improve the quality and
reliability of fire analysis data on successive fire incidents.

All of the aforementioned fire analysis data may be produced by a
human being or a team of human beings, present in or in communication
5 with central command 40. Preferably, all of the aforementioned fire analysis
data is produced using a computing device located in or in communication
with central command.

Continuous night/day Surveillance: Central Command

The method's use of a central command 40 permits centralized
10 command and control of night/day continuous surveillance inside optical
sensor map radius area or areas 55 inside periphery 60.

The method's use of a central command 40 permits centralized control
of optical sensor or sensors 10.

The method's use of a central command 40 permits centralized analysis
15 of all optical sensor signals 15.

The method's use of a central command 40 permits centralized drawing
of conclusions and formulation of fire response or fire attack decisions.

The method's use of a central command 40 permits centralized
distribution (Drawing C) 65 of fire analysis data to aerial fire fighting
20 station(s) 45, or ground fire fighting station(s) 50 or local and/or regional
and/or state/provincial and/or national disaster or emergence control
centers 35.

1 The method's use of a central command 40 permits centralized
issuance of alarm or alert orders 65 or fire attack orders 65 to aerial fire
fighting assets 46 or ground fire fighting assets 50.

 The method's use of a central command 40 permits centralized
5 informing or alerting 65 of hierarchically superior fire fighting command and
control authority or authorities 35.

 Central command 40, perhaps through the computerized control
console 20, issues an alarm order 65 based on the fire analysis data, as
described in the previous subparagraph, entitled "Continuous night/day
10 Surveillance: Analysis".

 Central command 40, preferably through the computerized control
console 20, alerts 65 the aerial forest fighting assets 46 or ground fire
fighting assets 50 when the fire analysis data justifies such alerting.

 Central command 40, preferably through the computerized control
15 console 20, issues an order 65 to aerial attack a fire or a newly detected fire
using the aerial forest fighting assets 46, when the fire analysis data
justifies such order.

 Central command 40, preferably through the computerized control
console 20, issues an order 65 to ground attack a fire or a newly detected
20 fire using the ground forest fighting assets 50, when the fire analysis data
justifies such order.

1 Central command 40, preferably through the computerized control console 20, may alert 65 the hierarchical superior fire fighting command and control assets 35 when the fire analysis data justifies such alerting.

5 All the aforementioned alarming, alerting and ordering 65 may include fire analysis data 65, enabling aerial fire fighting assets 46 or ground fire fighting assets 50 (if time is available) to prepare for or use the optimum aerial or ground surface route (whichever applicable) to be used to reach, approach and attack the fire.

10 All the aforementioned alarming, alerting and ordering 65 may include fire analysis data 65, enabling aerial fire fighting assets 46 or ground fire fighting assets 50 (if time is available) to prepare for or use the preferred type and quantity of fire containment assets, (such as fire retardants or other) in an attack on the fire.

15 All the aforementioned alarming, alerting and ordering 65 may include fire analysis data, enabling aerial fire fighting assets 46 or ground fire fighting assets 50 (if time is available) to prepare for the fire size, intensity, fire direction of movement and expected or predicted fire trend.

20 All the aforementioned alarming, alerting and ordering 65 may include fire analysis data, enabling hierarchical superior fire fighting command and control assets 35 to formulate appropriate responses.

 All of the above method may be repeated throughout the duration of a fire. For instance, the sensors 10 continually monitor each respective optical sensor map radius area 55 and sending signals 15 to the

1 computerized control console 20 in central command 40. Central command
40, preferably using computerized control console 20, continues analyzing
the data and observing the progress of the aerial 46 and ground 50 fire
fighting assets. Central command 40, preferably using computerized
5 control console 20, analyses respective success of each type of asset 46,
50. Based upon such analysis, additional alerts, alarms or attack orders 65
to aerial 46 or ground 50 fire fighting assets may be issued providing
instruction whether to continue a particular type of attack, strengthen or
modify the attack. That is, each of the above steps is repeated and
10 modified under the system of continuous surveillance from the sensors 10
and computer control console 20 under command and control of central
command 40.

Central Command geographic location may vary

Although Drawing D depicts central command 40 to be located within
15 and near the center of a strategic asset 42, if adequate telecommunication
means are available, central command 40 may be located at any location
of preference.

Although Drawing D depicts central command 40 to be located within
and near the center of a strategic asset 42, if adequate telecommunication
20 means are available, central command 40 may be located at any location
and command and control more than one strategic asset fire protection
operation, commanding and controlling fire protection for multiple strategic
asset 42's through the method described.

1 Although Drawing D depicts central command 40 to be located within
and near the center of a strategic asset 42, central command 40 may
indeed be located in a single command and control facility operative as
central command 40 for all protection of strategic asset 42's contained
5 within a region, state/province or nation, through the method described.

Changes may be made

 Although the present invention has been described with reference to
preferred embodiments, workers skilled in the art will recognize changes
may be made in form and detail without departing from the spirit and scope
10 of the invention.

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